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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER FERNANDEZ, SUSAN EMILY				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/721,667

**Applicant(s)**

HO ET AL.

**Examiner**

SUSAN E. FERNANDEZ

**Art Unit**

1651

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The amendment filed November 15, 2007, has been received and entered.

Claims 1-17 are pending and are examined on the merits.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being obvious over Chatteraj et al. (US Pat. 6,329,165) in view of Ridgway et al. (Water Treatment Membrane Processes, McGraw Hill, 1996, pages 6.1-6.62) and McNeel et al. (US 6,180,056).

Chattoraj et al. discloses a method for monitoring planktonic and sessile microbiological populations (i.e. biofouling) in an industrial water system. Chattoraj et al. teaches the same method steps as claimed in the present application, using the same fluorogenic agents (see claims 1-15; column 2, lines 30-67; column 3, lines 1-54; column 4, lines 7-34; column 5, lines 6-31, 63-64; column 6, lines 42-45; and column 7, lines 64-67 of Chattoraj et al.). Note that Chattoraj et al. indicates that commercially available fluorometers are suitable for the practice of their invention for detecting the fluorogenic agent (column 6, lines 42-45). In regards to the amount of fluorogenic agent used, Chattoraj discloses that “an effective amount of fluorogenic dye is between about 0.005 ppm and about 1.0 ppm, preferably between about 0.02 ppm and about 0.5 ppm, most preferably between about 0.04 ppm and about 0.1 ppm, and the most highly preferable amount of fluorogenic dye is 0.05 ppm” (column 5, lines 41-46). These ranges clearly fall within the ranges as claimed in claims 6-8 of the instant application.

Chattoraj et al. does not expressly disclose that: 1) the method is usable on a reverse osmosis membrane separation system such as those claimed in the instant application, and 2) biocontrol agents or biocontrol methods can be used to control biofouling (Chattoraj et al. only teach the use of oxidizing and non-oxidizing biocides, see claims 5-13).

However, Ridgway et al. teaches that membrane separation processes such as reverse osmosis play essential roles in modern water treatment practice (page 6.1, lines 1-3). Additionally, membrane biofouling is a widespread problem in these treatment processes, especially in feedwater and industrial processes such as ground-water treatment, seawater desalination, and water production (i.e. in industrial water systems). See section 6.5 “Occurrence of membrane biofouling” on pages 6.20-6.21. Additionally, applicant has disclosed that

membrane separation methods such as reverse osmosis are used in industrial processing of liquid streams, such as in water purification (page 1, lines 6-7 of the instant specification). Ridgway et al. also teaches that various options are available to control biofouling. Examples include the use of biocides, biocontrol agents (such as chelating agents, surfactants, and chaotropic agents), and biocontrol methods (such as ultrasound, electric fields, and air backwashes). See Table 6.4 on page 6.43.

Therefore, since reverse osmosis is commonly used in industrial water systems, as taught by Ridgway et al., it would have been obvious to use the method of Chatteraj et al. and apply it to reverse osmosis membrane separation systems. Although Chatteraj et al. only discloses the use of biocides as a means to control biofouling, it would have been obvious to modify that aspect of the method to include the use of other biocontrol agents and methods since these other venues are also known and practiced in the art, as disclosed by Ridgway et al.

Additionally, Chatteraj et al. differs from the claimed invention in that it does not require that the fluorescent signal is measured in the feed stream and the concentrate stream.

McNeel et al. discusses biofouling that occurs in reverse osmosis (RO) systems (column 1, lines 17-42). For reducing biofouling, McNeel et al. teaches introducing a biocide into the aqueous system which uses the separation membrane (abstract). To determine the effectiveness of the biocide in reducing biofouling, bacteria counts of the feed, permeate, and concentrate streams were taken (column 7, lines 61-65).

At the time the invention was made, it would have been obvious to the person of ordinary skill in the art to have carried out fluorescent signal measurements at the feed and concentrate streams in the Chatteraj invention performed on a reverse osmosis system. One of ordinary skill

in the art would have been motivated to do this since bacteria counts of the feed and concentrate streams of a reverse osmosis system had been shown to be required for determining the extent of biofouling and effect of added biocide, as taught in McNeel et al. Moreover, as bacteria may be present in these three streams (as pointed out in McNeel et al.), it would have been obvious to have taken fluorescent signal measurements of these three streams since the Chattoraj invention is for monitoring microbial populations in an industrial water system and using such determinations to control the amount of biocide added to said industrial water system (column 2, lines 23-27). Clearly, the bacterial content of the various streams must be monitored in controlling the amount of biocide added to an industrial water system with reverse osmosis membranes. Thus, a holding of obviousness is clearly required.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5 and 9-17 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 6,329,165 B1 (Chattoraj et al., document AG of the present IDS) in view of Ridgway et al., 1996 (document AP of the present IDS) and McNeel et al. Although conflicting claims are not identical, they are not patentably distinct from each other. Claims 1-5 and 9-17 of the instant application are directed to a method of monitoring biofouling in a membrane separation system comprising the steps of: a) adding a fluorogenic agent into the system; b) allowing the fluorogenic agent to react with microorganisms (e.g. planktonic microorganisms and sessile microorganisms) in the system to form a reacted fluorogenic agent; c) providing a fluorometer to measure fluorescence; d) measuring the fluorescent signals of the fluorogenic agent and the reacted fluorogenic agent; e) monitoring biofouling in the system by determining a ratio of the fluorescent signal of the reacted fluorogenic agent to the unreacted fluorogenic agent; and f) determining the rate of change of the fluorescence ratio. The method of the instant application is limited to membrane systems such as cross-flow or dead-end flow membrane systems, examples include reverse osmosis, nanofiltration, ultrafiltration, microfiltration, inter alia. Fluorogenic agents usable in the claimed method include resazurin, 4-methylumbelliferyl phosphate, pyranine phosphate, and

others. The method also comprises steps for controlling biofouling by way of biocontrol treatments such as the use of biocides, biocontrol agents or biocontrol methods. Additionally, an inert fluorescent tracer can be included.

Chattoraj et al. (in claims 1-15) discloses a method for monitoring planktonic and sessile microbiological populations (i.e. biofouling) in an industrial water system comprising the steps of: a) adding a fluorogenic agent into the system; b) allowing the fluorogenic agent to react with any planktonic microorganisms and sessile microorganisms in the system to form a reacted fluorogenic agent; c) providing a means for measuring fluorescence (i.e. a fluorometer); d) measuring the fluorescent signals of the fluorogenic agent and the reacted fluorogenic agent and calculating the ratio of the signals; e) monitoring biofouling in the system by determining a ratio of the fluorescent signal of the reacted fluorogenic agent to the unreacted fluorogenic agent; f) determining the rate of change of the fluorescence ratio; g) determining the optimal amount of biocide to add to the system based on the ratio or rate of ratio change; and h) delivering the optimal amount of biocide into the system. Fluorogenic dyes usable include resazurin, 4-methylumbelliferyl phosphate, and pyranine phosphate. Additionally, an inert fluorescent tracer can be included. Chattoraj et al. does not expressly disclose that: 1) the method is usable on membrane separation systems such as those claimed in the instant application, and 2) biocontrol agents or biocontrol methods can be used to control biofouling (Chattoraj et al. only teach the use of oxidizing and non-oxidizing biocides). However, Ridgway et al. teaches that membrane separation processes such as reverse osmosis, microfiltration, nanofiltration and ultrafiltration, play essential roles in modern water treatment practice (page 6.1, lines 1-3). Additionally, membrane biofouling is a widespread problem in these treatment processes, especially in



feedwater and industrial processes such as ground-water treatment, seawater desalination, and water production (i.e. in industrial water systems). See section 6.5 “Occurrence of membrane biofouling” on pages 6.20-6.21. Ridgway et al. also teaches that various options are available to control biofouling. Examples include the use of biocides, biocontrol agents (such as chelating agents, surfactants, and chaotropic agents), and biocontrol methods (such as ultrasound, electric fields, and air backwashes). See Table 6.4 on page 6.43.

Therefore, since membrane separation systems are commonly used in industrial water systems, as taught by Ridgway et al., it would have been obvious to use the method of Chatteraj et al. and apply it to membrane separation systems. Although Chatteraj et al. only disclose the use of biocides as a means to control biofouling, it would have been obvious to modify that aspect of the method to include the use of other biocontrol agents and methods since these other venues are also known and practiced in the art, as disclosed by Ridgway et al., *supra*.

Furthermore, it would have been obvious to have taken fluorescent signal measurements of the feed and concentrate streams of the reverse osmosis membrane system since bacteria is suspected of being present in these streams when biofouling occurs, as demonstrated by bacterial count measurements performed on such a water system in McNeel et al. (column 7, lines 61-65).

Thus, a double patenting rejection is required.

#### ***Response to Arguments***

Applicant's arguments filed November 15, 2007, have been fully considered but they are not persuasive. Though Ridgway et al. describes methods for monitoring biofouling wherein the

membrane is extracted, the combination of Chatteraj et al. with Ridgway et al. and McNeel et al. does not teach membrane extraction as the methods of Chatteraj et al., the primary reference, teach measuring bacteria in the water. Moreover, Chatteraj et al. points out using in-line measurement for the practice of its methods, wherein in-line measurement is "one that is taken without interrupting the flow of the system being measured" (column 6, lines 64-65). As Chatteraj et al. teaches an in-line measurement, Chatteraj et al. does not teach removal of any component of the system, including any membrane. While McNeel teaches testing the permeate, concentrate, and feed streams with a TOC test, McNeel is combined with Chatteraj et al. to provide the motivation to test these streams in a reverse osmosis membrane system by the fluorescence methods of Chatteraj et al. There would have been a reasonable expectation of success in substituting one method for measuring the presence of microorganisms with another (substituting the TOC test for fluorescence measurements which Chatteraj et al. indicates are suitable for in-line measurements). Finally, the applicant alleges that it would be unlikely that one of ordinary skill in the art would combine select teachings of knowledge/pick or choose parts of disclosures in formulating the claimed invention where all three disclosures all involve completely different techniques for monitoring biological systems. However, KSR decision forecloses the argument that a specific teaching, suggestion, or motivation is required to support a finding of obviousness. See the recent Board decision *Ex parte Smith*, --USPQ2d--, slip op. at 20, (Bd. Pat. App. & Interf. June 25, 2007) (citing *KSR*, 82 USPQ2d at 1396). Moreover, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

Art Unit: 1651

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN E. FERNANDEZ whose telephone number is (571)272-3444. The examiner can normally be reached on Mon-Fri 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon B Lankford Jr/  
Primary Examiner, Art Unit 1651

Susan E. Fernandez  
Examiner  
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sef